

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

"Structural Geography."

I MUST thank the reviewer of my "Structural Geography" in NATURE of March 11 for pointing out the accidental omission in printing of the red line that should have occurred over the course of the Apennines (Plate XVI.). If he thinks that Fig. 97 is really likely to hurt the feelings of the Polynesians, I may replace it by one with a more pleasing expression; but the other suggestions for the improvement of any possible second edition, which fill nearly three columns of NATURE, I cannot accept. Thus the use of isobaths instead of actual figures on Figs. 37 and 38 would obscure the lessons those figures were inserted to teach. Where, as on Fig. 41, isobaths seemed more useful, they were used.

The "strange blunder" in the figures on pp. 84 and 85 exists only in my critic's imagination. In both diagrams the wind is correctly shown as blowing at a low level out of the high-pressure area, and not into it. This movement, of course, requires the replacement of the air by a high-level inflow, and that is also indicated on the diagrams. In support of this well-known fact reference may be given to a work on elementary physiography, which should be regarded as of authority by NATURE. It says, p. 326:—"A barometer stands high . . . when in any way an upper current sets in towards a given area. . . ."

The reviewer remarks that it is not clear why certain branches of the subject are omitted or merely mentioned. That course was adopted deliberately. The object of the book was to supplement existing text-books, and, as stated in the preface, I omitted various "questions that are adequately treated in current elementary text-books."

My critic objects to the view that the Cotswold and Chiltern Hills show the geographical grain of England, as he says those hills are sculptural rather than structural; but the sculpturing in both cases has been determined by and displays the structural grain of the country.

The reviewer devotes most attention to Plate XVI., a diagrammatic map of Europe. He complains that the European plain is shown extending to County Clare, disregarding the Welsh and Wicklow Hills; but his statement is not correct. The name European plain is written only across Germany and Russia, and the text states (p. 132) that it is "the eastern extension of the eastern plain of England." The site of the Wicklow Hills is left white, and the boundaries of the English and Irish plains are not marked, for they were not needed for the map and were left unelaborated. No intelligent student is likely to include all the area left white in that map, including the Bay of Biscay, the Atlantic Ocean, &c., as belonging to the European plain.

Objection is also taken to the reference in that map to the Scottish Highlands and Scandinavia as parts of an Archæan plateau; but that they belong to a dissected plateau is explained in reference to Scotland on p. 105, and illustrated by a photograph (Plate XIII.), which, as the credit is due only to the photographer and the publishers, I may say is excellent. Then follows an objection to the Armorican and Variscan Mountains being differently coloured from the Central Plateau of France. That plateau has such a different geographical history that I think it is advisable to indicate its special importance by a different shade. The reviewer quotes the new Geological Survey map of France and some borings to confirm the connection of the Central Plateau and the Armorican Mountains. He might also have quoted the text of the book under review (p. 133):—"The southern border [of the Armorican Mountains] was to the south of Brittany and extended through the Vendée into that mass of old rocks known as the Central Plateau of France." The reviewer also attacks the representation of Spain on this

map. It shows the essential feature in the Spanish Peninsula, which I still think it was desirable to show, viz. the divergence of strike between the mountains south of the Guadalquivir fault and that of the western Meseta. The Asturian nest and its "confocal parabolic curves" would not have made for clearness. His severest criticism of this map of Europe relates to Asia Minor. He notes one difference between the representation of Asia Minor on the maps of Europe and Asia. He could have noted others, for on the map of Europe no attempt was made to show the structure of Asia Minor, as it was included more suitably in the map of Asia (Plate XIX.), which includes both Naumann's Pontic and Tauric Mountains. (The reviewer refers to Naumann's paper in the *Geographische Zeitschrift*, 1896; anyone interested in the question will find a simpler statement of that author's view, in English, in his paper before the Geographical Congress of 1895, Report, 1896, pp. 662-8.) These features were omitted from Asia Minor on the map of Europe; all that was inserted there was a dotted line to show both the continuation of the Cyprus branch of the Tauric line and its passage into the mountain knot south of the Caucasus. The line would no doubt have been better if, as in the map of Asia, the curve at its eastern end had been somewhat sharper.

In the explanation of Fig. 83 it is pointed out that Japan is exaggerated in width, and a student may be trusted to apply that remark to the sea beside Japan.

My critic apparently doubts the Mongolian affinity of the Eskimo. It is true that some authorities regard the American aborigines as a distinct race-group from the Mongolian, but there is ample authority for the other view. The difference in opinion is indicated by the warning that the American Indians are "generally regarded" as a Mongolian race. No doubt the Eskimo of Greenland differs markedly from the typical Mongolian. Their extreme dolichocephaly is one of the best-known facts in American anthropology; but as this character diminishes to the west, the view that the Eskimo are a modified variety of the American section of Mongolians is at least reasonable. The Caucasian affinity of the Australian aborigines seems to me better established, and the view has been gaining ground since its first authoritative advocacy by Dr. A. Russel Wallace, who justly claims it as one of his chief contributions to science.

The "so-called tetrahedral theory" has been growing steadily into favour since 1899, when I happened to support it in a lecture to the Geographical Society. Although its advance has probably been hampered by my crude explanations, I am quite satisfied with its progress, otherwise I should not have included it in a text-book. It seems to me quite unnecessary to refer to the earlier theories, though perhaps my critic would have been less displeased if I had referred to one later theory.

One great difficulty in writing elementary text-books is the necessity for a shortness that must often seem dogmatic, and for unqualified statements that are therefore liable to the charge of crudeness; but, fortunately, one can usually trust as safely to the common sense of students and teachers as to the fair appreciation by critics of the difficulty of presenting in brief statement and graphic diagrams the complex and confused data that have to be summarised in geographical text-books.

J. W. GREGORY.

4 Park Quadrant, Glasgow, March 16.

I FULLY acknowledge that the diagrams on pp. 84 and 85 are correct if taken by themselves, but in the explanatory letterpress given below Fig. 57 it is stated that the distribution of pressure is "owing to the condensation of the cooler air over the sea and the expansion of the warmer air over the land." The necessary inference is that the area over the land is one of low pressure and that over the sea of high pressure, with the winds blowing into the latter. On examination of the diagram I see that this is opposed to the inference which may be drawn from the course of the "level" of equal pressure, and hence I conclude that the error arises from a misprint, which may be easily set right by transposing the words "sea" and "land" in the statement I have put in italics.

The omission of certain branches of the subject called for comment, because it is precisely these which, as a rule, are not adequately treated in English text-books. The ordinary text-books are out of date, and I cannot but think an excellent opportunity of supplementing their belated information has been missed. It would not prove a very easy task, however.

The map on Plate XVI. was criticised independently of the letterpress, because a map should speak for itself, and in some detail, because it represents that part of the world most familiar to us. I must confess that the more I study this map the less I like it. I do not know why the Guadalquivir fault is more "essential" than many other features of Spain, and the true form of the Meseta, which it helps to define, would have been better shown if the dislocation which forms the eastern boundary of the Meseta had been introduced. The "grain" of the land, shown by heavy blue lines like those used to express the Caledonian trend in Scotland, and not black like the Armorican in Brittany, is not correctly given even by those lines which are cut off by the fault; if they had been more precisely indicated and the Asturian curves added, a definite system, somewhat resembling a nest of parabolas, would have made itself manifest. The fundamental structure of the Meseta would then have been visible at a glance. Had only as much of these lines been introduced as is required to show their relation to the fault, the only objection that could have been raised would have been as to their incompleteness; as it stands, my comment that the map fails to express the true structure of Spain is a mild way of stating the facts. Passing to the Armorican peninsula, which, thanks to the observations of Barrois, is better known, we again find the trend lines out of drawing. It is difficult to know on what principle some have been omitted and others introduced; the omission does not make for clearness, and in this case, as in that of Spain, a truthful rendering would have simplified the facts by making them more intelligible. If the lines of Armorica had been properly generalised, we should have seen one of the most important of them (*axe de Cornouailles*) pointing straight at the Central Plateau, and the introduction of trend lines in the Central Plateau would have made clear the relation on which I insisted when pointing out that the connection of the trend lines of Brittany and the Central Plateau is no hypothesis, but a definitely known fact.

As it stands on the map, I still think the legend "Archæan Plateau of North-Western Europe" written across a tract showing strong Caledonian folding is confusing, and I cannot agree that anything in the subsequent history of this Central Plateau or of Spain calls for its distinction by colour from the rest of the Hercynian system; I am the more disposed to object to this colour scheme, since the same colour is used for Spain, the Central Plateau, and the so-called Archæan Plateau of the north, thus introducing a second source of confusion. It was not complained that the structure of Asia Minor is omitted from the map which bears the title "Europe," but that an important line common to Europe and Asia is wrongly drawn. The Cyprus-Taurus line is one of the most conspicuous on the map, and is rendered all the more so by the omission of other lines in Asia Minor. That part of it (in Transcaucasia) which is most erroneously drawn is not dotted in, but continuous; but even in Europe it does not run true, the relation of the Peloponnesus to Crete being inaccurately indicated. In the map of Asia greater care is exercised over this and related lines, but if Oswald's account of Armenia is correct there is still room for improvement. I am unaware of the existence of a mountain "knot" south of the Caucasus.

The objection to the diagram section shown in Fig. 83 is that the vertical scale is somewhere between 50 and 100 times the horizontal. Geologists have long agreed that such exaggerations are to be deprecated.

Assuming that the Eskimo are modified Mongolians, how does the action of the environment, as asserted by the author, account for the chief modification which distinguishes them, that is, the elongation of their heads? and to this I may add now the length of their face and the narrowness of their nose. The question involved

is the direct action of the environment, and in my opinion schoolboys should not be indoctrinated with notions of this kind. Again, admitting that the Australian aborigines are related to what the author calls "Caucasians," what reason is there for the assertion that they are "modified Caucasians"? This is to invert the order of facts. Numerous important anatomical characters stamp these people as a primitive race. The most plausible speculation would assign them a position near the root of the "Caucasian" stem, regarding them as an unprogressive survival of an ancestral stock rather than as one of the higher races "modified by adaptation to life in an arid region." But why introduce these jejune speculations at all?

The real gravamen of the criticism to which objection is taken lies in the remark that the author has not been sufficiently careful to distinguish between opinion and fact. The treatment of the whole question of the form of the earth is open to this charge. I do not understand the cryptic remark which the author interjects in his reference to this matter, but I may add that, in the opinion of competent mathematicians, there is no sound physics or dynamics at the back of the "tetrahedral" theory. It has proved wholly unfruitful, and has made no real scientific progress. That it has grown in popular favour is probably true, and its dogmatic presentation in a school text-book is calculated to advance it still further in this kind of progress; I cannot believe that this will be wholly to the satisfaction of the author, since I credit him with a juster appreciation of the responsibility which attaches to the instruction of youth.

THE REVIEWER.

The Gases of the Ring Nebula in Lyra.

EVERY friend of astronomical research has learned with great pleasure the news that Prof. Wolf, of Heidelberg, has succeeded in proving by spectrum photography that the well-known ring nebula in Lyra consists of four different gases, which, owing to the rapid rotation of the ring, have been separated and concentrated in four different layers. On using the image of the ring itself instead of the slit of a spectroscope, photographic images of the rings corresponding to the different spectral lines were obtained on the plates, but the dimensions of the rings were found to be different and to correspond to four gases of which the ring nebula is composed. The smallest ring, A, representing the innermost part of the ring, is composed of an unknown gas; the next largest ring, B, is composed of hydrogen; the next largest ring, C, consists of helium; and the largest ring, D, consists of an unknown gas. The question arises, What is the nature of the two unknown gases?

Bredig found in 1895 that if a mixture of two gases is subjected to centrifugal rotation, the relative concentration of the gas of higher molecular weight (i.e. higher density) increases with the radius of rotation. We must, therefore, assume that in the series of our four gases A, B, C, and D, the density or molecular weight increases from the smallest value of A to the largest value of D, and this is, indeed, proved by the fact, found by Wolf, that the gas B consists of hydrogen, molecular weight=2.016, and the gas C of helium, molecular weight=3.96. From this it follows that the gas concentrated in the smallest zone of the ring A must have a smaller molecular weight than hydrogen. This gas has not yet been isolated upon our earth, but its existence and atomic weight were predicted by the great Russian chemist and natural philosopher Mendeléeff in a popular article published in Russian in 1902, the essential part of which was translated into English in 1904 under the title "An Attempt towards a Chemical Conception of the Æther."

Mendeléeff shows that if the elements of the rare or inactive gases He, Ne, Ar, Kr, and Xe, discovered by Rayleigh, Ramsay, and Travers, are placed in the well-known nought-group, we must expect the existence of elements of the same group possessing smaller atomic weights than helium and hydrogen. Mendeléeff assumes that in the first horizontal series of the system, on the left side of, or before, hydrogen in the nought-group, where